

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY)		2. REPORT TYPE Technical Papers		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER 6340	
				5e. TASK NUMBER 0039	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Research Laboratory (AFMC) AFRL/PRS 5 Pollux Drive Edwards AFB CA 93524-7048				8. PERFORMING ORGANIZATION REPORT	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Air Force Research Laboratory (AFMC) AFRL/PRS 5 Pollux Drive Edwards AFB CA 93524-7048				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT A	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Leilani Richardson
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) (661) 275-5015

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

1 item enclosed

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MEMORANDUM FOR PR (Contractor/In-House Publication)

FROM: PROI (TI) (STINFO)

13 Nov 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2000-219**
Gulczynski, F.S., "Powersail High Power Propulsion System Design Study"

37th AIAA/ASME/SAE/ASEE Joint Propulsion Conference (Statement A)
(Salt Lake City, UT, 8-11 Jul 2001) (Deadline for Abstract: 08 Nov 00)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

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PHILIP A. KESSEL Date
Technical Advisor
Propulsion Science and Advanced Concepts Division

Powersail High Power Propulsion System Design Study

Frank S. Gulczinski III*
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A desire by the United States Air Force to exploit the space environment has led to a need for increased on-orbit electrical power availability. To enable this, the Air Force Research Laboratory Space Vehicles Directorate (AFRL/VS) is developing Powersail, a two-phased program to demonstrate high power (100 kW to 1 MW) capability in space using a deployable, flexible solar array connected to the host spacecraft using a slack umbilical. The first phase will be a proof-of-concept demonstration at ~50 kW, followed by the second phase, an operational system at full power. In support of this program, the AFRL Propulsion Directorate's Spacecraft Propulsion Branch (AFRL/PPS) at Edwards AFB has commissioned a design study of the Powersail High Power Propulsion System. The purpose of this study, the results of which are summarized in this paper, is to perform mission and design trades to identify potential full-power applications (both near-Earth and interplanetary) and the corresponding propulsion system requirements and design. The design study shall further identify a suitable low power demonstration flight that maximizes risk reduction for the fully operational system. This propulsion system is expected to be threefold: (1) primary propulsion for moving the entire vehicle, (2) a propulsion unit that maintains the solar array position relative to the host spacecraft, and (3) control propulsion for maintaining proper orientation for the flexible solar array.

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* Research Scientist, AFRL Electric Propulsion Group, Member AIAA